PART I

BACKGROUND OF THE STUDY

CHAPTER 1 STUDY OBJECTIVES AND BACKGROUND

1.1 STUDY OBJECTIVES

Surabaya Metropolitan Area plays a significant role in the development of a region which includes the provinces of East Java, as well as the eastern part of Indonesia. In order to fulfill its function in the development of the region, it is essential that Surabaya Metropolitan Area is subject to suitable directives to govern development within the area.

In recognition of this need the Government of the Republic of Indonesia decided that it was necessary to conduct an Urban Development Planning Study centring on the Surabaya Metropolitan Area (SMA), but based on an overall Planning Study of the GERBANGKERTOSUSILA (GKS) Region.

The objectives of the Study are as follows:

- to formulate a development strategy and a development structure plan up to the year 2000 for the Surabaya Metropolitan Area within an óverall plan for the GERBANG-KERTOSUSILA Region.
- to perform technology transfer to Indonesian counterparts during the course of the Study.

1.2 STUDY BACKGROUND

The Study is based on consideration that the structure plan for the development of SMA, from an urban planning point of view, should be established as soon as possible in order to guide the various development activities into an appropriate regional formation within the GKS Region.

This Study therefore is required to prepare the structure plan for Surabaya Metropolitan Area, which was defined as Surabaya City and its surrounding area including urban centres in GKS Region strongly related to Surabaya City. However, as discussed at the meetings with Ministry of Public Works and the first Inter-department Steering Committee held on December 1, 4, 5, 7 and 9, 1981, "the elaboration of SMA development plan into development strategy which will cover long-term as well as short-term is considered as Phase I of the development study of the whole GKS Region. The Phase II and the following phases of the Study will not be covered under this present Scope of Work and will be decided later by the Government".

The Study Team strongly recommends that Phase II studies on the peripheral areas such as Mojokerto, Lamongan, and Bangkalan influence areas should be performed from a regional and rural planning viewpoint, considering the results of this Study.

1.3 NATIONAL DEVELOPMENT CONTEXT

The national goal of development is identified as follows:

1) Promotion of harmony between sectoral and regional development efforts;
2) Balance growth among the regions of the country;
3) Development of the administrative capacity of the regions to enable full participation in development effort; and
4) The total development of Indonesia as an economic unit.

These objectives should be interpreted in the context of National goals such as unity, social and economic development and equitable distribution of the benefit of development.

East Java with such a dense population, from the National point of view, stands slightly behind in term of per capita income. Per capita Gross Regional Product (GRP) of East Java was 87% of the National average. It challenges the East Java Provincial Government to speed up its pace of development. Among other things, intensified investment resource allocation will give income distribution at the National level.

As a relatively low income region, East Java needs to have particular effort for economic development.

Also, the human resources which are more than abundant in quantity may have to be utilized elsewhere for a more balanced growth of all regions.

Standing on the recognition of this development context, the Study Team concentrated on finding a solution to the problems of establishing a new dual system with organic order in the Study Area; e.g. one is the system of effective industrialization to grade up the socio-economic activity. The other is the system of efficient distribution of goods and benefit in order to establish the harmonious and equal growth among the regions of the country.

Furthermore, the Study Team considers that a major policy and development programme is indispensable and that because of the function of the Study Area as a leading growth pole in East Java the achievement of the goal will be impossible without intensive investment being injected into the Study Area.

In this meaning, the plan proposed in this Study is challenging and is made in expectation of aggressive promotion by the Government.

CHAPTER 2 EXISTING CONDITIONS

2.1 SOCIO-ECONOMIC CONDITIONS

(1) POPULATION

It can be seen that higher annual growth rates are occuring in Surabaya (2.85%) and Sidoarjo (2.77%) as shown in Table 2.2.1.

The urbanization of GKS is clearly shown in the distribution of population. Kod. Surabaya, Kab. Gresik and Kab. Mojokerto have higher density than 5,000 person/km^2, and Surabaya has an area of 13 km^2 which has a density higher than 30,000 persons/km^2.

In terms of total growth, GKS is slightly less than the Indonesian average of 2.4% p.a., but the urbanization is further reflected with the high growth rates in urban areas. The natural growth rate in GKS is estimated to be 1.86% p.a., and the social growth rate 0.30% p.a.

(2) HISTORICAL CHANGE OF URBANIZATION

Surabaya City has experienced a drastic population increase in the urban area since 1920's as shown in Fig. 2.4.4.

Reviewing the historical change in urbanization in Surabaya City, it can be seen in Fig. 2.4.3 that it was only 10–20 years ago that the urban area spread to west and east, adding to the south as in the past.

(3) ECONOMIC STRUCTURE

In 1978, the GRDP (Gross Regional Domestic Product) of East Java was 3.2 trillion Rupiah with the primary sector such as agriculture, forestry and fishery having the largest share at 1.3 trillion Rupiah or about 41% of the total.

GKS Region produced about 0.9 trillion Rupiah in terms of GRDP in 1978 at current prices, of which the commercial industry accounted for the largest share of 26.3% followed by the farm food crops, manufacturing and transportation industries on higher shares of GRDP as compared in Fig. 2.2.5.

The existing regional economic structure such as GRDP by industrial sector, per capita GRDP, employment structure is presented for respective area components of GKS Region as shown in Table 2.3.7 and the distribution of GRDP is depicted in Fig. 2.2.8.

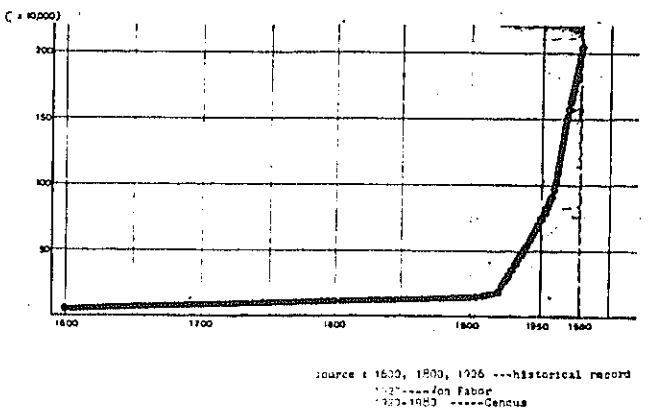


Fig. 2.4.4 POPULATION GROWTH IN SURABAYA BETWEEN 1600 – 1980

Table 2.2.1 POPULATION AND ANNUAL GROWTH

	AREA (km2)	Population by Census (persons)			Annual Growth Rate(%)	
		Oct '61	Sep ' 71	Oct ' 80	61 - 71	71 - 80
Indonesia	1,919,443 (100.0)	97,085,348 (100.0)	119,208,229 (100.0)	147,490,298 (100.0)	2.07	2.39
Jawa	132,187 (6.9)	63,059,575 (65.0)	76,086,327 (63.8)	91,269,528 (61.9)	1.90	2.04
Jawa Timur	47,922 (2.5) (100.0)	21,823,020 (22.5) (100.0)	25,516,999 (21.4) (100.0)	29,188,852 (19.8) (100.0)	1.58	1.50
G.K.S	5,679.22 (11.9) (100.0)	4,108,169 (18.8) (100.0)	5,041,529 (19.8) (100.0)	6,111,935 (21.0) (100.0)	2.07	2.16
Gresik	1,136.43 (20.0)	592,309 (14.4)	610,944 (12.1)	728,570 (11.9)	0.31	1.98
Bangkalan	1,244.71 (21.9)	574,348 (14.0)	631,455 (12.5)	688,291 (11.3)	0.95	0.96
Kod. Mojokerto	7.25 (0.1)	51,732 (1.3)	60,013 (1.2)	68,507 (1.0)	1.50	1.48
Surabaya	291.78 (5.1)	1,165,306 (28.4)	1,566,255 (31.1)	2,017,527 (33.2)	3.00	2.85
Sidoarjo	614.27 (10.8)	457,385 (11.1)	667,639 (13.2)	853,685 (14.0)	3.85	2.77
Lamongan	1,555.18 (27.4)	772,599 (18.8)	909,038 (18.0)	1,049,808 (17.2)	1,64	1.61
Kab. Mojokerto	829.60 (14.6)	494,492 (12.0)	596,185 (11.8)	705,547 (11.5)	1.89	1.89

Source : National Census 1961, 1971, 1980.

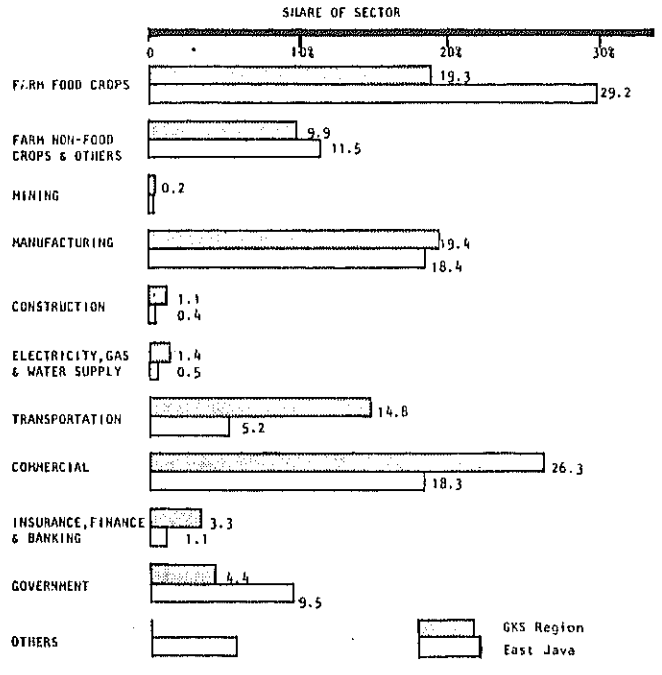
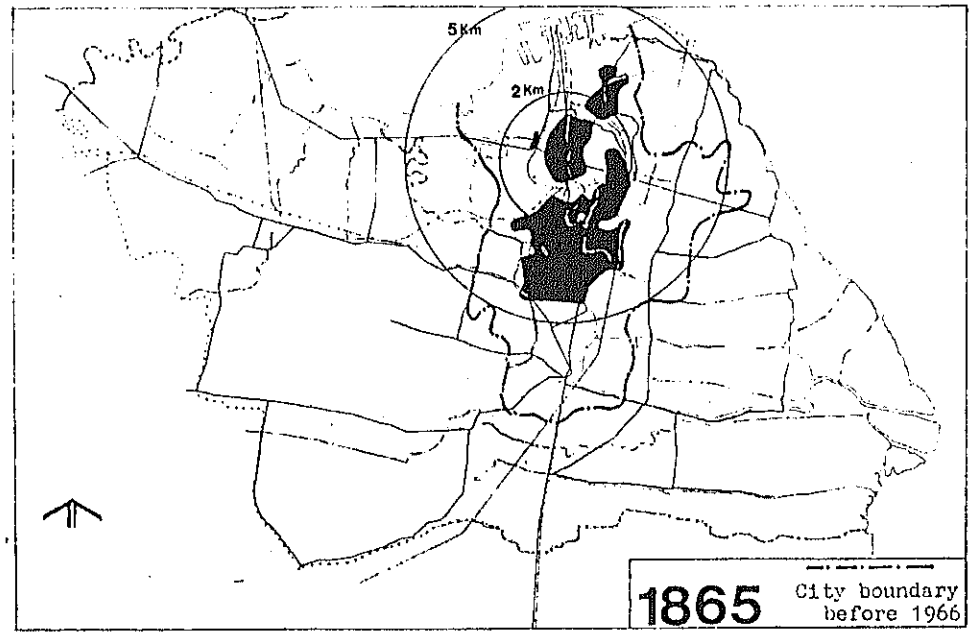
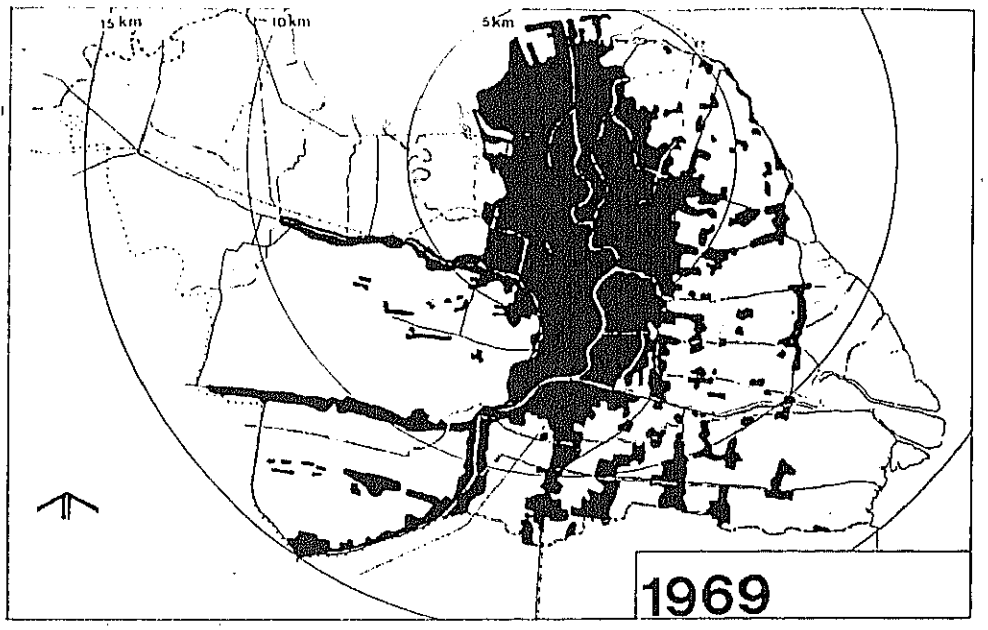
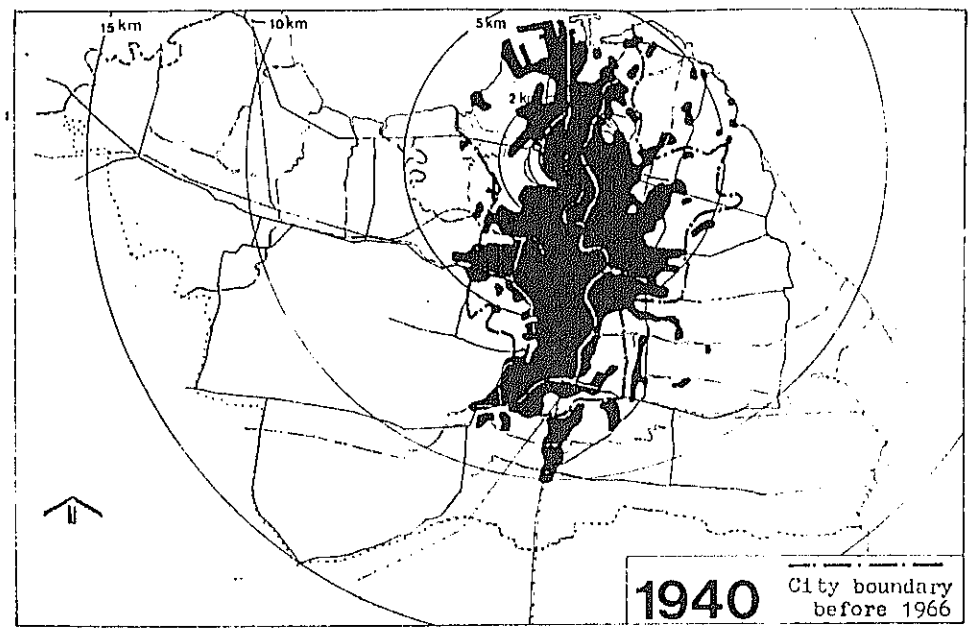


Fig. 2.2.5 COMPARISON OF INDUSTRIAL STRUCTURE, GKS REGION & EAST JAVA (BASED ON GRDP IN 1978)







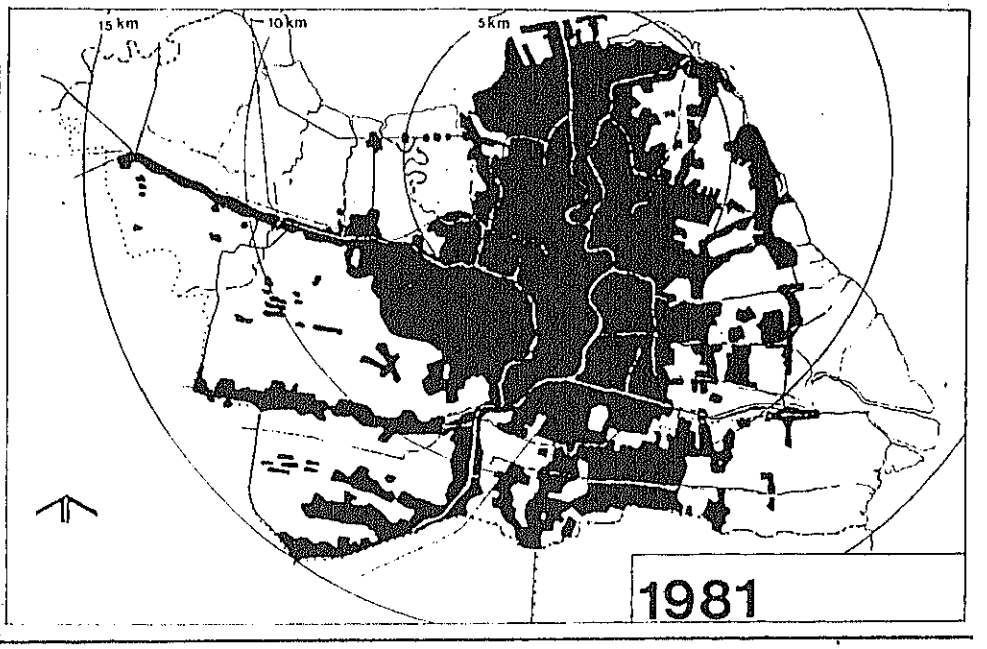


Fig. 2.4.3 HISTORICAL CHANGE OF URBANIZATION

Table 2.3.7 EXISTING REGIONAL ECONOMIC STRUCTURE IN GKS REGION, 1980

	Population (persons)	Per Capita GRDP at 1975 Prices (Rp.)	Industrial Sector	GRDP at 1975 prices (Mill. Rp.)	(% share)	Employment (Persons)	(% share)
Gresik	728,570	71,963	Primary	18,609	35.5	161,358	53.8
			Secondary	13,036	24.9	30,774	10.2
			Tertiary	20,785	39.6	108,111	36.0
			Total	52,430	100.0	300,244	100.0
Bangkalan	688,291	50,992	Primary	17,795	50.7	174,593	66.0
			Secondary	1,881	5.4	3,772	1.4
			Tertiary	15,421	43.9	86,009	32.6
			Total	35,097	100.0	264,373	100.0
Kod. Mojokerto	68,507	62,008	Primary	90	2.1	568	2.3
			Secondary	1,007	23.7	2,601	10.7
			Tertiary	3,151	74.2	21,229	87.0
			Total	4,248	100.0	24,398	100.0
Kab. Mojokerto	705,547	72,564	Primary	22,605	44.2	143,006	48.2
			Secondary	8,909	17.4	20,974	7.1
			Tertiary	19,683	38.4	132,632	44.7
			Total	51,197	100.0	296,612	100.0
Surabaya	2,017,527	181,357	Primary	16,224	4.4	24,257	3.2
			Secondary	82,783	22.6	105,310	13.8
			Tertiary	266,886	72.9	631,163	83.0
			Total	365,893	100.0	760,729	100.0
Sidoarjo	853,685	87,789	Primary	26,421	35.3	153,176	42.3
			Secondary	24,371	32.5	56,593	15.6
			Tertiary	24,152	32.2	152,697	42.1
			Total	74,944	100.0	362,466	100.0
Lamongan	1,049,808	56,277	Primary	48,125	64.5	466,871	83.9
			Secondary	7,074	12.0	13,589	2.4
			Tertiary	113,881	23.5	75,919	13.7
			Total	59,080	100.0	556,379	100.0
GKS	6,111,935	105,186	Primary	139,870	21.8	1,123,649	43.8
			Secondary	139,061	21.6	233,613	9.1
			Tertiary	363,958	56.6	1,207,760	47.1
			Total	642,889	100.0	2,565,022	100.0
SMA	2,905,414	152,076	Primary	39,931	9.0	186,593	16.3
			Secondary	107,528	24.3	162,959	14.3
			Tertiary	294,384	66.6	792,216	69.4
			Total	441,843	100.0	1,141,768	100.0
Other GKS	3,206,521	62,699	Primary	99,939	49.7	937,056	65.8
			Secondary	31,533	15.7	70,654	5.0
			Tertiary	69,574	34.6	415,544	29.2
			Total	201,046	100.0	1,423,254	100.0

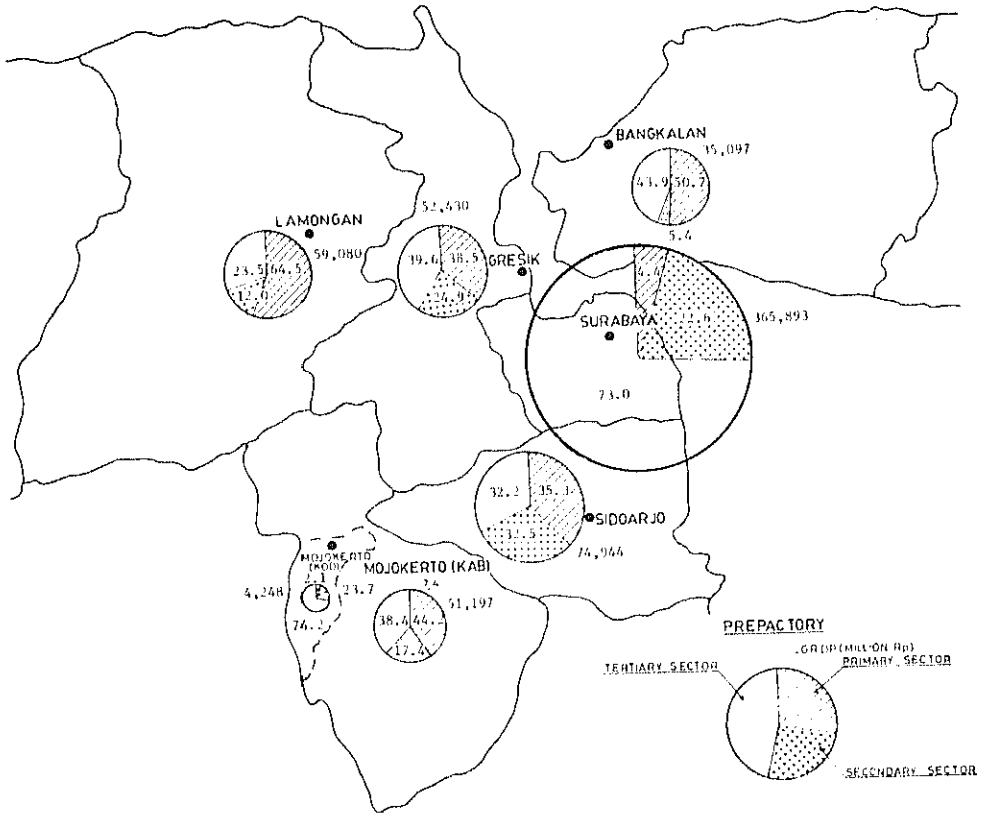


Fig. 2.2.8 ESTIMATED SIZE & COMPOSITION OF GRDP IN GKS REGION (1980) (1975 PRICE)

2.2 PHYSICAL CONDITIONS

(1) TOPOGRAPHY AND CLIMATE

GKS Region is divided into 3 topographic areas: low plain area, rolling hills and mountain areas.

The low plain areas with a height of less than 25 m above sea level, are located in the river basins (Sala Rivers, Brantas and Lamon Rivers). These areas include such as the centre of Lamongan, the centre to north of Gresik, the whole of Sidoarjo, in and aroung Majokerto and Bangkalan cities, and most of Surabaya city. Out side the towns the areas are mainly used for rice production, except for the coastal area of Gresik, Surabaya and Sidoarjo, which with tidal influence are used for fish and salt ponds.

The rolling hill areas (elevation between 25 m and 300 m) are located to the north and south of Lamongan city, the north of Mojokerto city and south-west of Gresik city, the central area of Kabupatan Bangkalan and the south-west of Surabaya city. These areas afford little opportunity for crop cultivation due to the lack of water, and forestry in the area is predominately on teak production.

The mountain area in GKS Region is to the south of Mojokerto, where it rises up to the peak of the Boklorahabuh mountain (EL = 2,206 m).

SMA experiences a tropical climate with the dry season generally lasting from May to October, and the wet season from November to April. The northerly monsoon, which prevails from November to February, is responsible for the heavy rain during the wet season. The southeast tradewinds maintain a slightly cooler dry season by carrying milder air from the Australian continent. The mean annual rainfall is 1,321 mm, of which about 90% is concentrated in the rainy season from November to May. The average annual temperature is 26.9°C.

2.3 LANDUSE

(1) PRESENT LANDUSE IN GKS REGION – 1981

In order to understand the current landuse in GKS region, the existing landuse map was prepared as shown in Fig. 2.4.1. This was to a 1/100,000 scale and was based on interpretation of the 1/50,000 scale photographs taken in 1981. From study of this may, the current situation of landuse can be described as follows:

- Generally speaking, GKS region as a whole is characterized by rural landuse, except for Surabaya.
- Extensive agricultural area in GKS region is composed of paddy field in flat areas and other agriculture products on slope areas.
- The following are surmised from interpretation of the photographs.
  - Paddy field in flat areas is not always cultivated every year.
  - Un-used land and waste land seems to be cultivated according to season, such as only in rainy season, etc.
- Fish ponds to a width of 5 – 10 Km extend along the coast of Kab. Gresik, Kab. Sidoarjo and Katamadya Surabaya.
- Majority of the urban area is concentrated in the city of Surabaya, and other urban areas are formed surrounding markets and shopping streets in Gresik, Lamongan, Mojokerto, Sidoarjo, Bangkalan, Krian and Babat.
- Large scale manufacturing is concentrated mainly in the city of Surabaya, but others can be seen in Sidoarjo and Gresik. In Mojokerto, a few sugar factories are distributed.
- It is characterized that large scale manufacturing is located along the major roads connected with Surabaya and other cities such as Gresik, Sidoarjo and Krian.
- Hamlets are dispersed in the extensive agricultural area. The distribution pattern of hamlets can be classified into three types as follows:
  - Linear Type: Hamlets are formed along the road, canal and river in the high quality agricultural land. This type can be seen in the area lying between Kali Surabaya and Kali Porong.
  - Scattered Type: Hamlets are scattered in the northern part of Kali Surabaya, mainly in Kab. Lamongan.
  - Unformed Type: This type means that the border of hamlet can not be clearly defined and this type can be seen in Kab. Bangkalan.

(2) PRESENT LANDUSE IN SURABAYA CITY – 1981

The present landuse in Surabaya, 1981 was interpreted as shown in Fig. 2.4.2.

Some significant features of present landuse in Surabaya are as follows:

- Surabaya consists of rural areas in the western and eastern parts, with the central part as an urban area.
- Urbanization in the central part of Surabaya is eroding agricultural areas in the east and west.
- In detail, Surabaya consist of fishponds in the north and agricultural landuse in the south. Also the eastern part of the city is divided into the east-side along the coast as fishponds and the west-side adjoining the urbanized area as agricultural landuse.
- Large and small scale commercial activities have distrinctive location characteristics.
- The CBD consists of two areas, one is the older and densely developed CBD to the north of the city incorporating major roads such as Kembang Tupun, Kapasa, Pabean, Slompretan. The other one is the newer and expanding Basuki Rahmad, Embong Malang, Kedungdoro, Bubutan and Tunjungan.
- In Wonokromo, various commercial activities are concentrated outside the CBD mentioned above. It means likely that Wonokromo is being formed as a sub CBD, thus making a pair of CBD in the north.
- There are some places where industrial landuse areas are concentrated.

Areas and percentage composition of landuse is Surabaya are summarized in Table 2.4.1.

Table 2.4.1 LANDUSE COMPOSITION IN SURABAYA

	(ha)	% of Total
Residential	4,674.7	16.0
Medium density residential	1,722.7	5.9
High density residential	346.9	1.2
Mixed area *	570.6	1.9
Administrative and public service	205.8	0.7
Educational	203.6	0.7
Recreational	120.3	0.4
Cementery	133.2	0.5
Manufacturing factories	707.9	2.4
Warehouses	135.1	0.5
Distribution facilities	175.7	0.6
Uncultivated/un-used	2,720.3	9.3
Agricultural (wet crop/day crop)	9,240.9	31.7
Fishpond and salt field	5,702.4	19.5
Forest	798.2	2.7
Road	416.3	1.4
Railway	97.8	0.3
River	507.2	1.7
Military	698.4	2.4
Total	29,178.0	100.0

* residential, commercial, industrial

NOTE : All areas were estimated by the Study Team from Interpretation of the 1/20,000 Scale Plan.

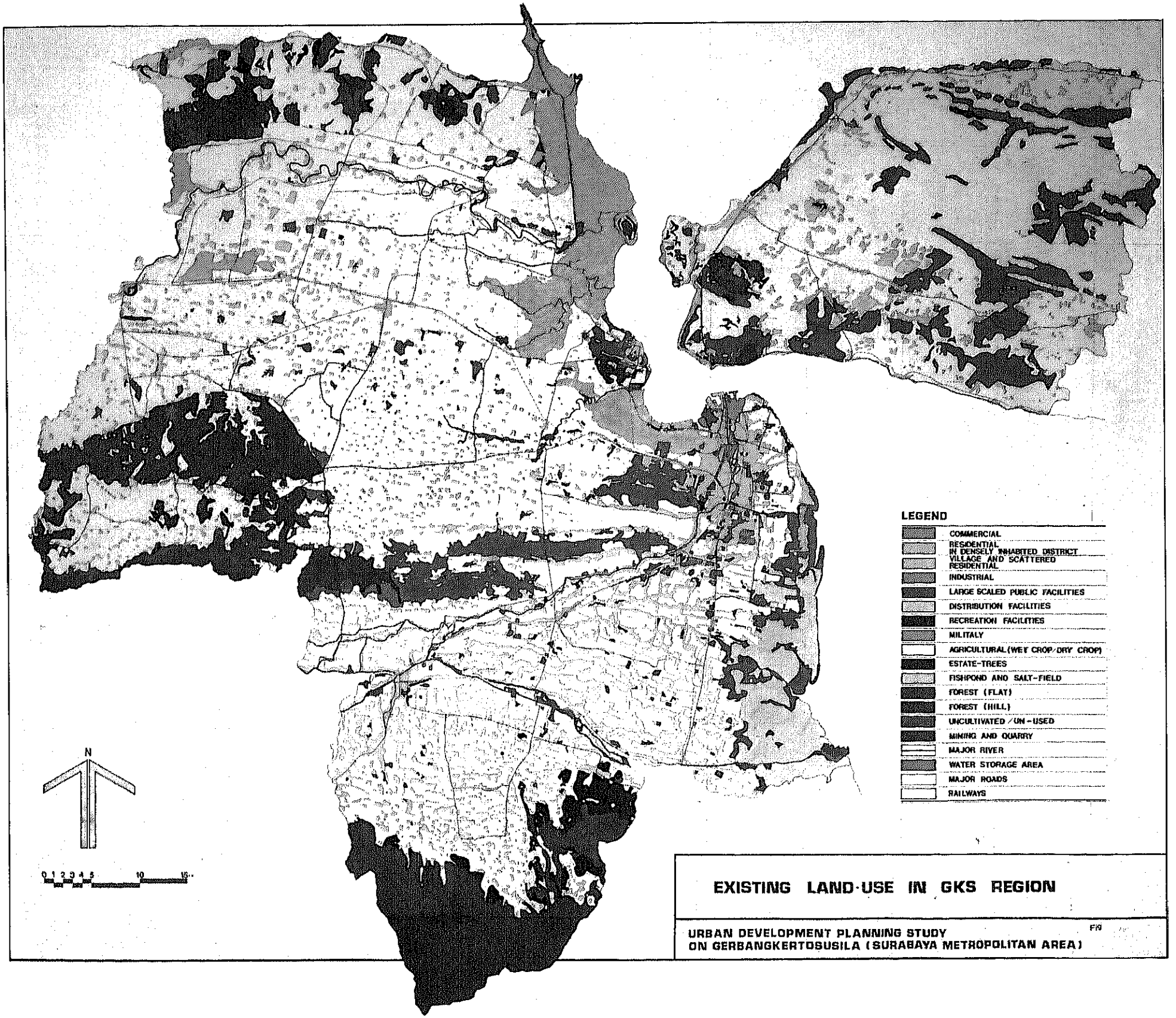


Fig. 2.4.1 EXISTING LANDUSE IN GKS REGION (1981)

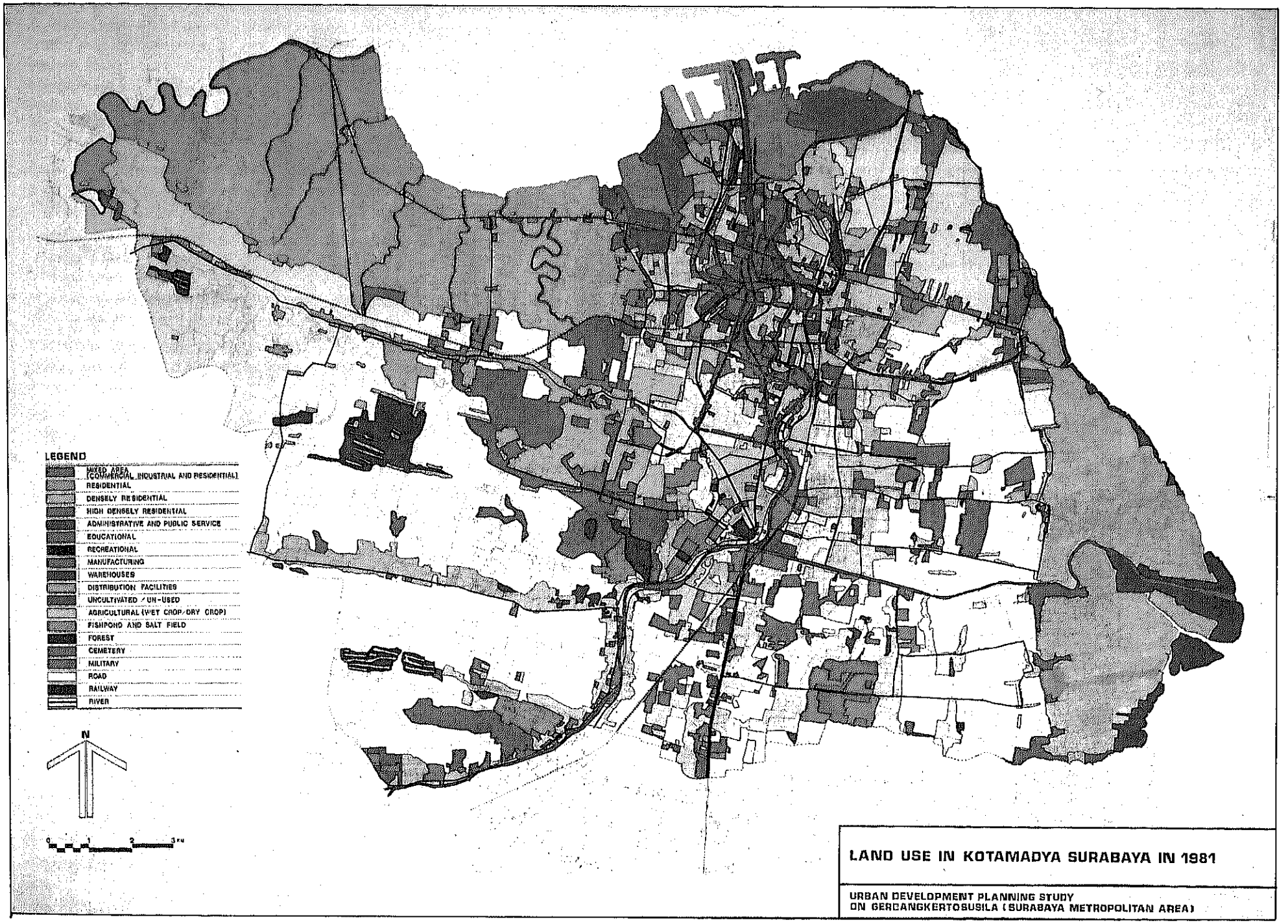


Fig. 2.4.2 EXISTING LANDUSE IN SURABAYA CITY (1981)

2.4 TRANSPORTATION

(1) ROADS AND TRAFFIC

(i) Vehicle Ownership

In terms of the number of registered vehicles in Java island, West Java occupies a dominant share of more than 50% of the Java total. Particularly, DKI Jakarta accounts for more than 30% of the Java Total as shown in Table 2.5.1.

The growth of vehicle ownership in Surabaya averages 12.7% per annum and a motorization rate is 2.3 times larger in 1980 than in 1971, as shown in Tables 2.5.3 and 2.5.4. Motorcycles in Surabaya are the principal transport means. From the viewpoint of traffic flows, particularly on main streets in a city, motorcycles weaving in and out of the traffic are an impediment to other traffic which results in reduced capacity and increased traffic accidents. Therefore the rapid increase and higher level of motorcycle ownership is not favourable to safe smooth flow, without counter measures to cope with such problems.

(ii) Traffic Flows

Fig. 2.5.1 compares 1975 and 1980 volumes from which a conceptual traffic flow diagram is derived as shown in Fig. 2.5.2. Major trafic flows in Java are in the following directions:

- Jakarta-Bekasi-Cikampek-Cirebon-Tegal-Semarang
- Jakarta-Bogor-Bandung
- Semarang-Yogyakarta
- Surabaya-Sidoarjo-Malang
- Surabaya-Mojokerto-Jombang-Madiun-Surakarta

Traffic growth between 1975 and 1980 is particularly significant along the above major routes, and around the cities of Jakarta, Bandung, Cirebon, Semarang, Yogyakarta, Malang and Surabaya.

Besides these the connecting routes between Purwokerto and Semarang/Yogyakarta route are noteworthy.

Thus 4 traffic influence zones can be conceived in Java centring around the cities of Jakarta/Bandung, Cirebon, Semarang/Yogyakarta and Surabaya/Malang.

Major arterial roads of Surabaya-Porong, Surabaya-Mojokerto-Jombang and Surabaya-Gresik-Babat have been resurfaced recently by the Road Betterment Office and new road construction in these corridors is now in progress as shown below:

Surabaya-Malang Tollway	:	under construction
Surabaya-Gresik Tollway	:	Feasibility study was completed in 1980
Mojokerto Bypass	:	Completed in July, 1982

Compared with the improvement of the above major arterial roads, collector and local roads are given less road maintenance. Roads in these categories have functions either to support arterial roads or to connect local core cities. Traffic demand on several roads at collector level in particular, has increased and this now requiries the improvement of road surface, alignment, bridges and road width. Future traffic demand on the road sections of Taman-Sepanjang-Kalangpilang, Krian-Legundi-Sepanjang, Babat-Ploso-Mojokerto/Jombang, and Lamongan-Gedeg-Mojokerto, are likely to increase.

The road network of Surabaya City is shown in Fig. 2.5.8 and it has been formed under restrictions of the geographical features, the rivers and the railroads.

The CBD of Surabaya is located in an area with a width of 3 km along Kali Mas, and surrounded by the north – south bound railroad and the old tramway.

(2) RAILWAY

(i) Railway Lines

Trunk railway lines connected with Surabaya consist of the Northern Line, Southern Line and Eastern Line as shown schematically in Fig. 2.5.9.

Terminal stations in Surabaya are Pasar Turi on the Northern line and Surabaya Kota

Table 2.5.1 VEHICLE OWNERSHIP IN JAVA AND GKS REGION, 1978

	West Java			Central Java	East Java			Total Java
	DKI JKT	Others	Total		GKS	Others	Total	
1. Passenger Cars (1)	190,566 (46.0)	96,774 (23.3)	287,340 (69.3)	50,358 (12.1)	38,105 (9.2)	38,815 (9.4)	76,920 (18.6)	414,618 (100.0)
2. Trucks	58,449 (27.6)	59,226 (28.0)	117,675 (55.6)	47,932 (22.7)	22,719 (10.9)	23,120 (10.9)	45,839 (21.7)	211,446 (100.0)
3. Buses(2)	17,132 (52.2)	6,100 (18.6)	23,232 (70.7)	4,843 (14.7)	1,782 (5.4)	2,987 (9.1)	4,769 (14.5)	32,844 (100.0)
4. Motorcycles	369,428 (28.2)	241,361 (18.4)	610,789 (46.6)	321,383 (24.5)	181,814 (13.9)	196,265 (15.0)	378,081 (28.9)	1,310,253 (100.0)
Total	635,575 (32.3)	403,461 (20.5)	1,039,036 (52.8)	424,516 (21.6)	244,422 (12.4)	261,187 (13.3)	505,609 (25.7)	1,969,161 (100.0)

Source : "Statistik Indonesia, 1979" Biro Pusat Statistik Jakarta
"GKS Report, JILID IV Transportasi, September, 1979"

Note : (1) Passenger cars include sedan, jeep, station wagon, taxi, oplet, bemo and ambulance
(2) Buses include colt, combi, micro bus.

Table 2.5.3 GROWTH OF VEHICLE OWNERSHIP IN SURABAYA

	Passenger car	Trucks	Buses	Motorcyle	Total
1971	21,133	9,175	968	53,652	84,928
1972	23,308	9,954	984	62,157	96,403
1973	26,474	10,957	1,051	78,182	116,664
1974	26,445	11,393	1,166	91,639	130,643
1975	29,234	12,976	1,076	115,380	158,666
1976	31,665	14,677	1,114	134,042	181,528
1977	34,102	17,524	1,317	155,263	208,206
1978	34,465	19,991	1,398	156,459	212,313
1979	36,972	22,100	1,597	167,085	227,754
1980	40,927	25,484	1,656	184,424	252,491
1981	45,525	27,506	1,678	206,926	281,635

Source : Traffic Police of Surabaya City

Source: Surabaya City Traffic Police

Table 2.5.4 VEHICLE COMPOSITION RATES AND MOTORIZATION RATES IN SURABAYA, 1971 & 1980

	Pass. Cars	Trucks	Buses	M. Cycle	Total	Pop**(x10^3)
1971: Vehicle composition rate (%)	24.9	10.8	1.1	63.2	100.0	1,556
Motorization rate*	13.6	5.9	0.6	34.5	54.6	
1980: Vehicle composition rate (%)	16.2	10.1	0.7	73.0	100.0	2,032
Motorization rate*	20.1	12.5	0.8	90.8	124.3	

Note: * Vehicles per 1000 persons
** National Census 1971 and 1980

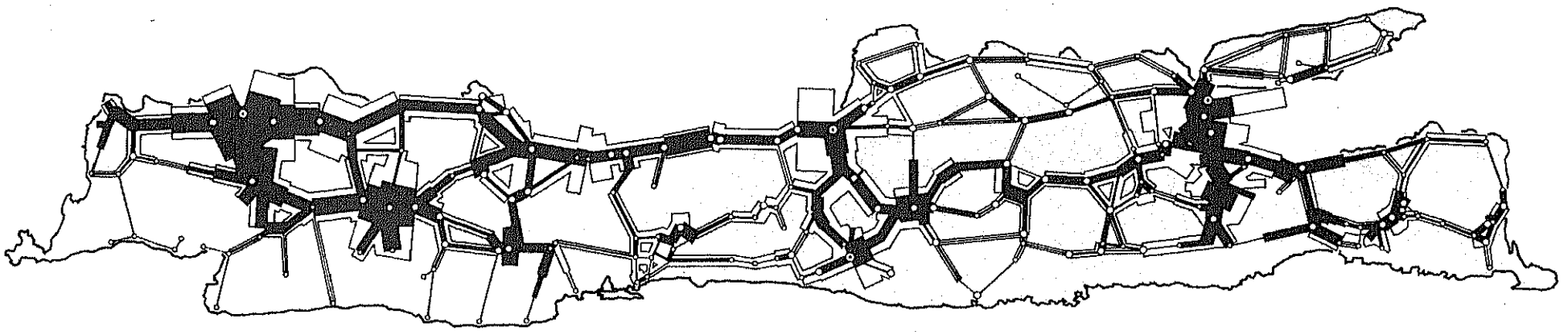


Fig. 2.5.1 COMPARISON OF TRAFFIC FLOWS IN 1975 AND 1980

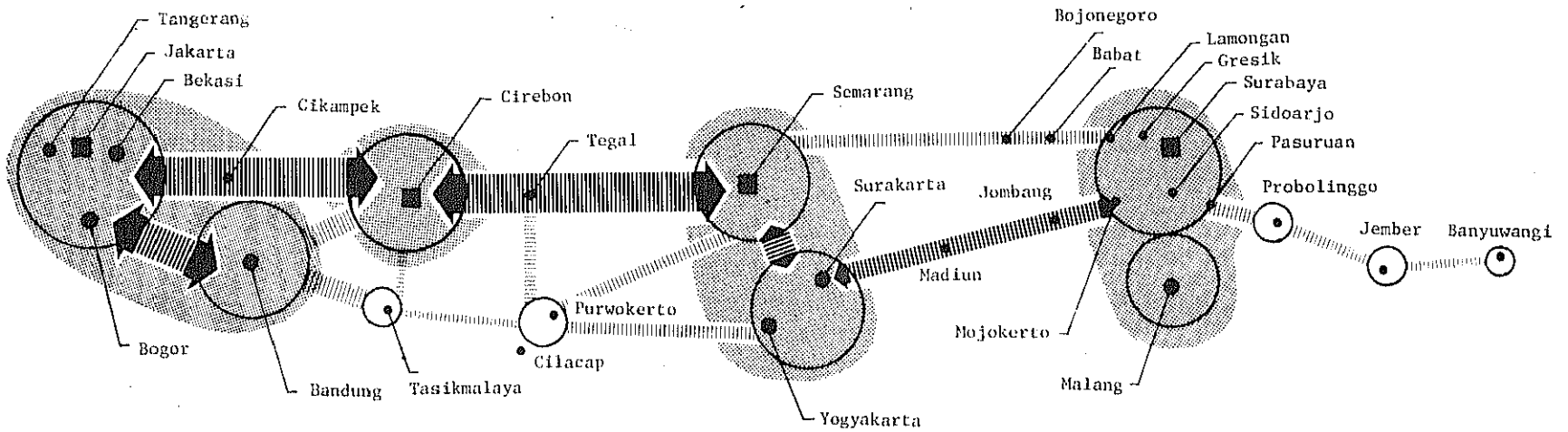


Fig. 2.5.2 CONCEPTUAL DIAGRAM FOR TRAFFIC FLOWS IN 1980

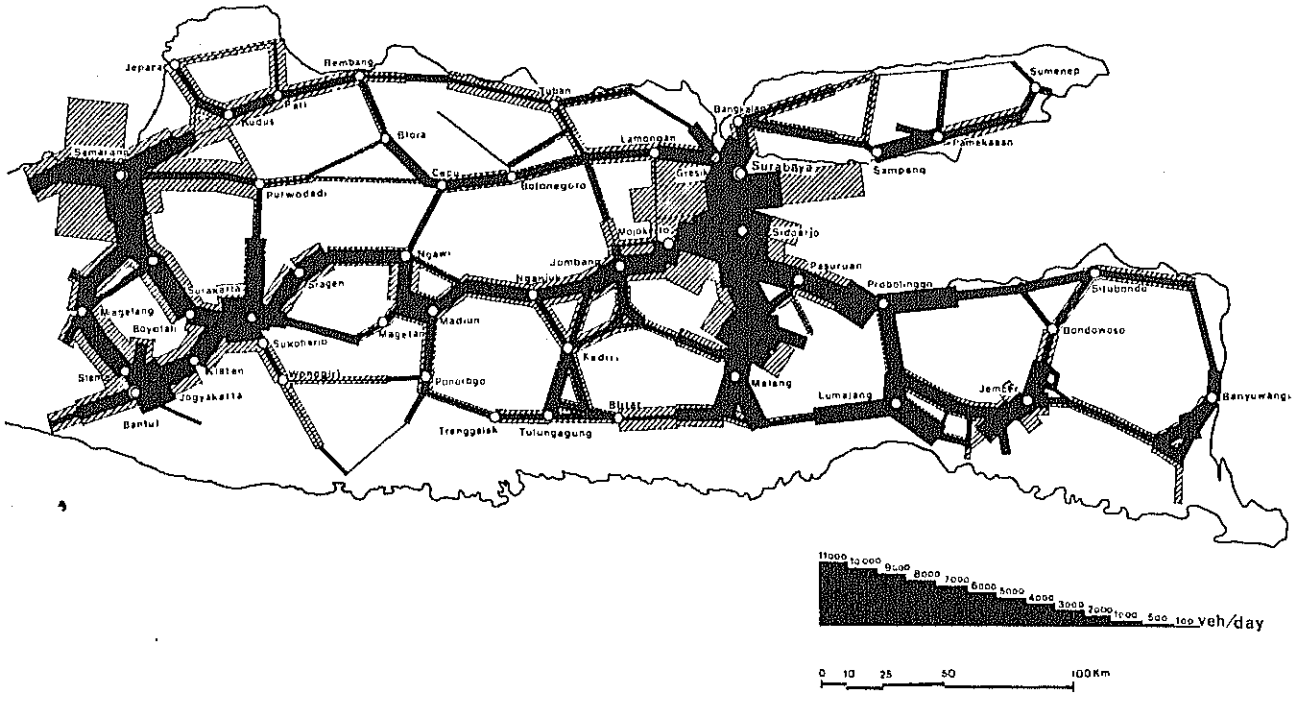
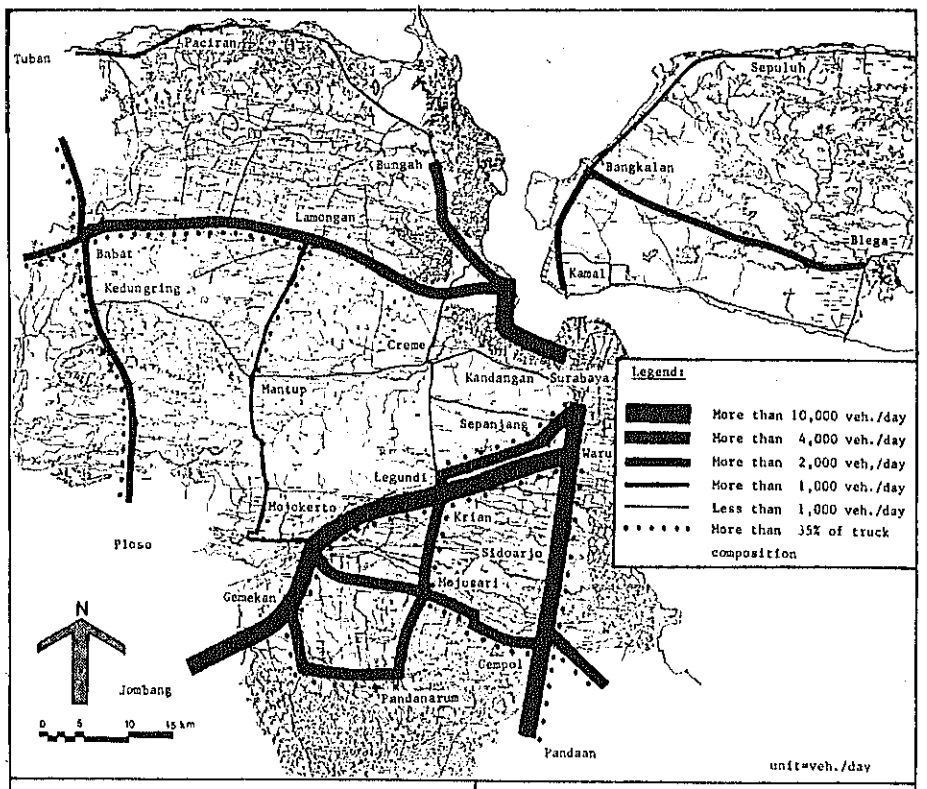


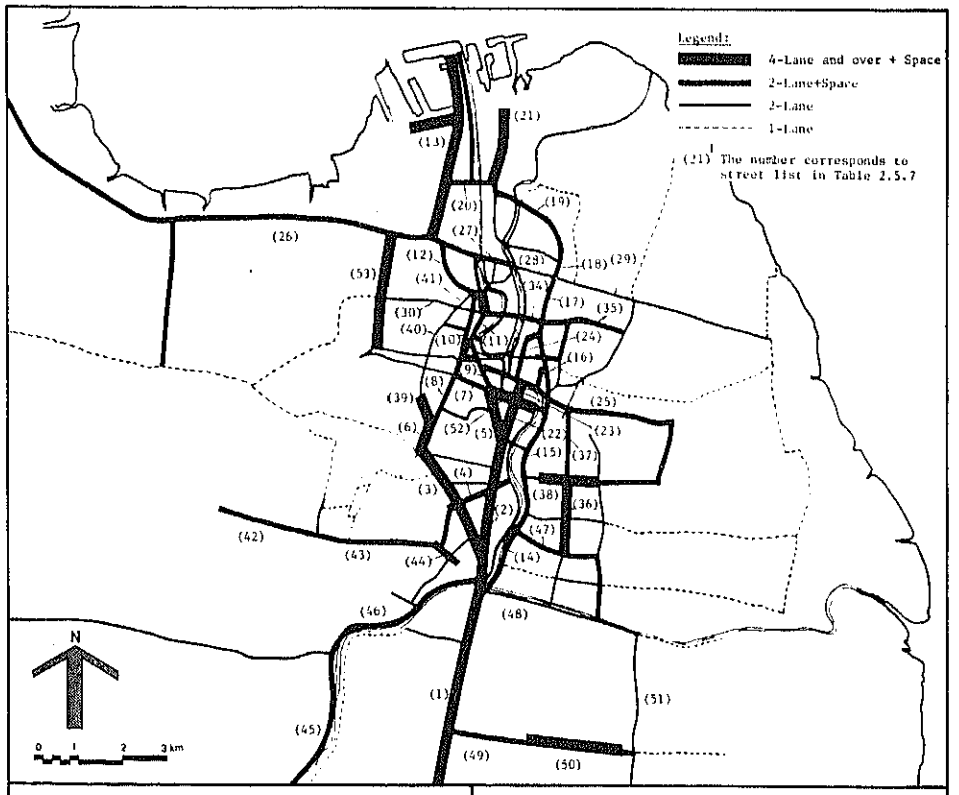
Fig. 2.5.3 DEVELOPMENT OF TRAFFIC FLOWS IN EAST JAVA, 1975 TO 1980



URBAN DEVELOPMENT PLANNING STUDY
ON GERBANGKERTOSUSILA
(SURABAYA METROPOLITAN AREA)

Fig. 2.5.6

TRAFFIC FLOWS AND VOLUMES
IN GKS REGION, 1981



URBAN DEVELOPMENT PLANNING STUDY
ON GERBANGKERTOSUSILA
(SURABAYA METROPOLITAN AREA)

Fig.2.5.8

EXISTING ROAD NETWORK
IN SURABAYA

for both the Southern and Eastern lines. These two terminal stations are not directly connected by rail but transit passengers between the two lines (Northern line – Southern line or Northern line – Eastern line) are carried by bus between Gubeng station and Pasar Turi station.

(ii) Passenger and Cargo Traffic

Rail accounts for only a small percentage of person movement in Surabaya and GKS. Departing rail passengers from Surabaya is about 5,000 persons/day and this is a 20% of the inter-city bus passengers in Surabaya.

Railway cargo traffic in GKS Region as well as in Surabaya has been fluctuating and the traffic growth has been discouraging.

Major commodities carried out of Surabaya are petroleum, fertilizer and cement, which are loaded at Benteng and Kalimas stations. These major commodities are the sea port (Tg. Perak) generated traffic. Thus, railway transport largely relies on the demand from Tg. Perak port. Total cargoes loaded at these stations accounted for more than 85% of the total cargoes bound for outside Surabaya.

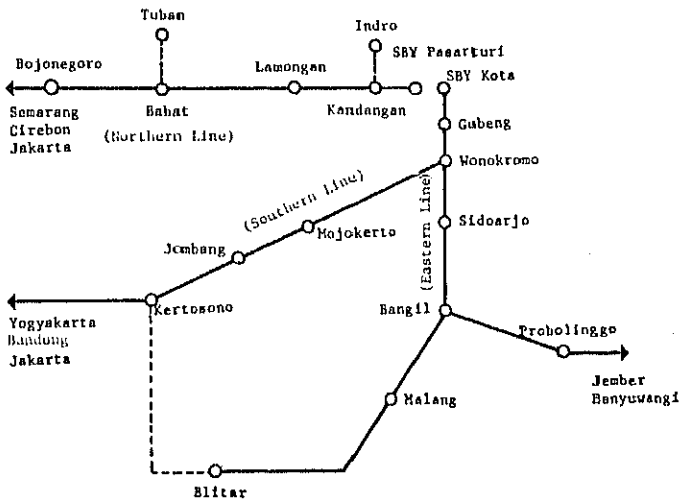


Fig. 2.5.9 SCHEMATIC RAILWAY LINES IN EAST JAVA

(3) BUS, BEMO, COLT

Major public transportation means in Surabaya and GKS Region are buses, bemo and colt.

City bus transport in Surabaya is operated almost entirely by PN DAMRI (Indonesia State Bus Unit), and inter-city transport in 1980 in East Java was operated by 156 companies with 1824 buses. On the whole, bemo supplements the city bus service and colt supplements the inter-city bus for medium distance travel. Surabaya buses carry about 210,000 passengers per day and bemos and colts about 250,000 and 19,000 passengers/day respectively.

(4) SEAPORT

The port of Surabaya is one of the four major ports in the Indonesian Regional Strategy. The traffic of Tg. Perak port in the last 3 years from 1978 to 1981 steadily increased at a rate of 10.7% of p.a. and shares of ocean-going and inter-island traffic are more or less equal.

A characteristic of current cargo flows in Surabaya from 1979 to 1981 was increase in container traffic of 63.1% p.a. in terms of cargo tonnage. There is much scope for further increase in containerized traffic, as the current figures are still relatively low compared to other international ports.

At present, main items carried out of the port by rail are petroleum, cement and grain, while the main inward traffic to the port is molasses. Land-ward port traffic by rail is estimated at less than 10 percent of the port traffic excluding transhipment and petroleum. In 1981, total petroleum handled at the port was 3.174 million tons so that over-

all cargo traffic throughout amounted to 9.045 million tons excluding transhipment between domestic and foreign trade.

(5) AIRPORT

Air traffic to and from Surabaya grew at an average annual rate of 16.9% and 19.2% for passengers and cargo respectively, between 1974 and 1980, but figures are still relatively low and total passengers in 1980 amounted to 1.3 million and cargo 11,800 tons.

(6) TRUCK TERMINALS

Sidotopo truck terminal is located to the immediate west of Sidotopo marshalling yard in the north of Surabaya. The area of the terminal totals 50,000 m^2, of which 8,352 m^2 is for the warehouses (9-units) and 13,666 m^2 for the truck yard and passway.

Heavy trucks (class I and II) account for 74.5% of the total trucks using the terminal.

Heavy trucks and truck/trailers are subject to restrictions on certain streets in Surabaya. While necessary for environmental and traffic reasons, these restrictions add to the cost of moving raw goods and finished material within Surabaya.

(7) BUS TERMINAL

There are two bus terminals in Surabaya, they are Joyoboyo and Jembatan Merah. These terminals connect the inter-city transport by bus and colt with the city transport by city bus, bemo and becak. The present situation of these terminals is that demand is greater than capacity and there is need for expansion or replacement. The terminals access directly to the busy main streets and bring about traffic conflicts in their vicinity. The present features of the two terminals are summarized in Table 2.5.28.

(8) FERRY

Ferry is only the way to communicate with Madura Island and transport is operated by 4 major companies. Traffic demand is shown in Table 2.5.29.

Table 2.5.28 PRESENT FEATURE OF BUS TERMINALS

	Jembatan Merah Terminal	Joyoboyo Terminal
Area	2,100 m^2	11,135 m^2 + 6,256 m^2 (PJKA)
Parking Space	Bus : 25 Bemo : 50 Colt/taxi : 50 Total : 125	Bus : 110 vehicles Bemo : 200 Colt/Taxi : 50 Total : 360
Operating Routes	Inter-city Bus: 1 directions (5 routes) City Bus : Joyoboyo-Jembatan Merah Colt/taxi : 3 directions Bemo : 7 routes Toyota Kijang : 2 routes	Inter-city Bus : 4 directions City Bus : Joyoboyo-Jembatan Merah, Aloha -Jembatan Merah Colt/taxi : 2 directions Bemo : 8 routes (4-wheel Bemo), 2 routes (3-wheel Bemo) Toyota Kijang : 1 route
Traffic and Passengers volume per day (In+Out)	Inter-city Bus : 220 Buses 7,000 pass. City Bus : 1,340 Buses 55,000 pass. Colt/taxi : 250 vehicles 5,000 pass. Bemo : 6,500 vehicles 63,000 pass.	Inter-city Bus : 1,500 Buses 45,000 pass. City Bus : 970 Buses 45,000 pass Colt/taxi : 750 vehicles 13,500 pass Bemo : 15,600 vehicles 105,000 pass.

Table 2.5.29 TRAFFIC VOLUME BY FERRY TRANSPORT FROM SURABAYA TO KAMAL

(unit: x 1000)

Year	Passengers	Vehicle Volume 4-Wheel	Vehicle Volume 2-Wheel	Cargo (ton)	Animal (head)
1977	2,410	236	-	122	31
1978	3,689	295	129	261	49
1979	4,681	361	281	254	27
1980	4,802	416	375	262	23
1981	3,925	472	339	366	11
Average Annual growth rate (%)	13.0	18.9	38.0	31.6	(22.8)

Source : Seksi L.L.A., Inspeksi VIII L.L.A.S.D.P.
Note : Figures in parenthesis ( ) indicates negative growth.

(9) PERSON TRIP CHARACTERISTICS

(i) Trip Rate

From the results of person trip analysis the following can be summarized:

a) Average trip rate in Surabaya and the urban area of GKS Region was estimated at 1.85 trips/person.

b) Most of the travellers make two trips per person and a small proportion of those make over 2 trips/person. This will mean that most travellers only make a round trip between home and destination, without a drop in somewhere else for a different trip purpose.

c) The age group of "more than 20 years of age" showed very low trip rates. This is because non-workers except for students and pupils are usually those in work status of "Domestic Affairs", "Unemployed" and "Retired". Among workers there exists about 10% of workers, who did not make any trips on the survey date, and they must be regarded as casual workers.

(ii) Trip Purpose Distribution

According to the survey results the distribution of trip purpose is as shown in Table 3.1.2. In this table "Home to work" and "Home to school" trips, which are the major components of morning peak traffic, accounted for 40.2% of the total daily trips.

Table 3.1.2 DISTRIBUTION OF TRIP PURPOSE

Trip Purpose	Samples	%	Tokyo Metropolitan Study in 1978 (%)
1. Home to work	7,150	17.1	13.4
2. Home to school	9,637	23.1	9.7
3. Business*	1,114	2.7	12.2
4. Return to home	20,057	48.1	40.6
5. Others**	3,787	9.0	24.1
6. Total	41,745	100.0	100.0

Source : Survey results by the Study Team.
Notes : *Including "Collecting/Delivering Goods", "As part of Work" and "Return to Company".
**Including "Shopping/private affairs", "Social/recreation" and "Others"

(iii) Trip Purpose and Choice of Travel Mode

A percentage composition of travel mode for each trip purpose is derived from the Home Interview Survey as shown in Fig. 3.1.2. The most popular modes for "Home to work" and "Home to school" are "motorcycle" and "on foot" respectively. "Business" trip is mainly made by motorcycle and followed closely by "on foot", "City Bus/Bemo/Colt" and "Sedan/Jeep". Trips of "Others" purpose are made "on foot" for nearly 50% of this trip purpose, followed by "Becak" and "Motorcycle". "Railway" only shares 0.1% of the total trips, or 0.16% excluding "on foot" trips.

(iv) Distribution of Trip Time and Trip Distance

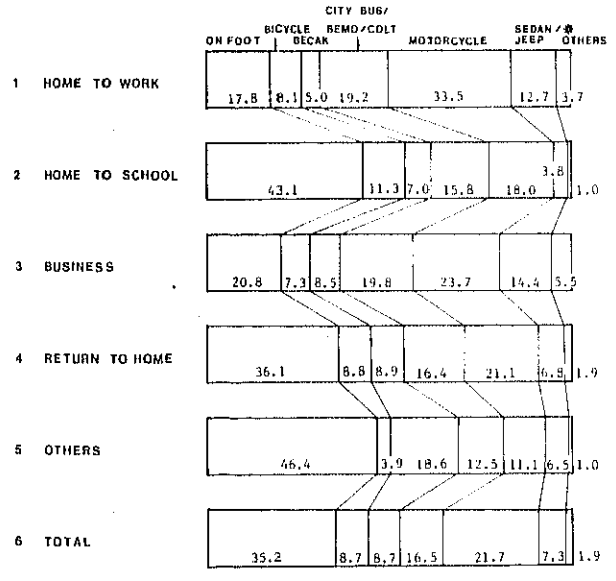
The average travel time for all modes of travel is found to be 17.4 minutes and average trip time of person trips is 19.1 minutes. The average travel distance for all modes of travel and average trip distance of person trips, are 4.7 km and 5.1 km respectively. These are derived from the distribution of travel time by mode as shown in Fig. 3.1.3.

Most of the modes show a drastic drop in single-mode travel demand at 30 to 40 minutes travel time. This will mean that the area enclosed by 30 to 40 minutes travel time is some activity unit area of the residents and those who make more than 30–40 minutes travel intend to make inter-regional activities. Means of public transportation mostly serving the area activities are classified as becak, city bus, and bemo/colt.

85% of the city bus and bemo/colt passengers are now making their public transport journey of less than 7 km.

(10) PERSON TRIP O-D PATTERN

The resulting person trip Block O-D table is summarized in Table 3.1.5; and the total person trips generated and attracted in Surabaya was 3,708,588 desire line traffic among the zones in Surabaya and in GKS are presented in Fig. 3.1.8.



Note: * Others include Truck, Inter-city bus, Railway and Ship/ferry.

Fig. 3.1.2 COMPOSITION OF TRAVEL MODE BY PURPOSE

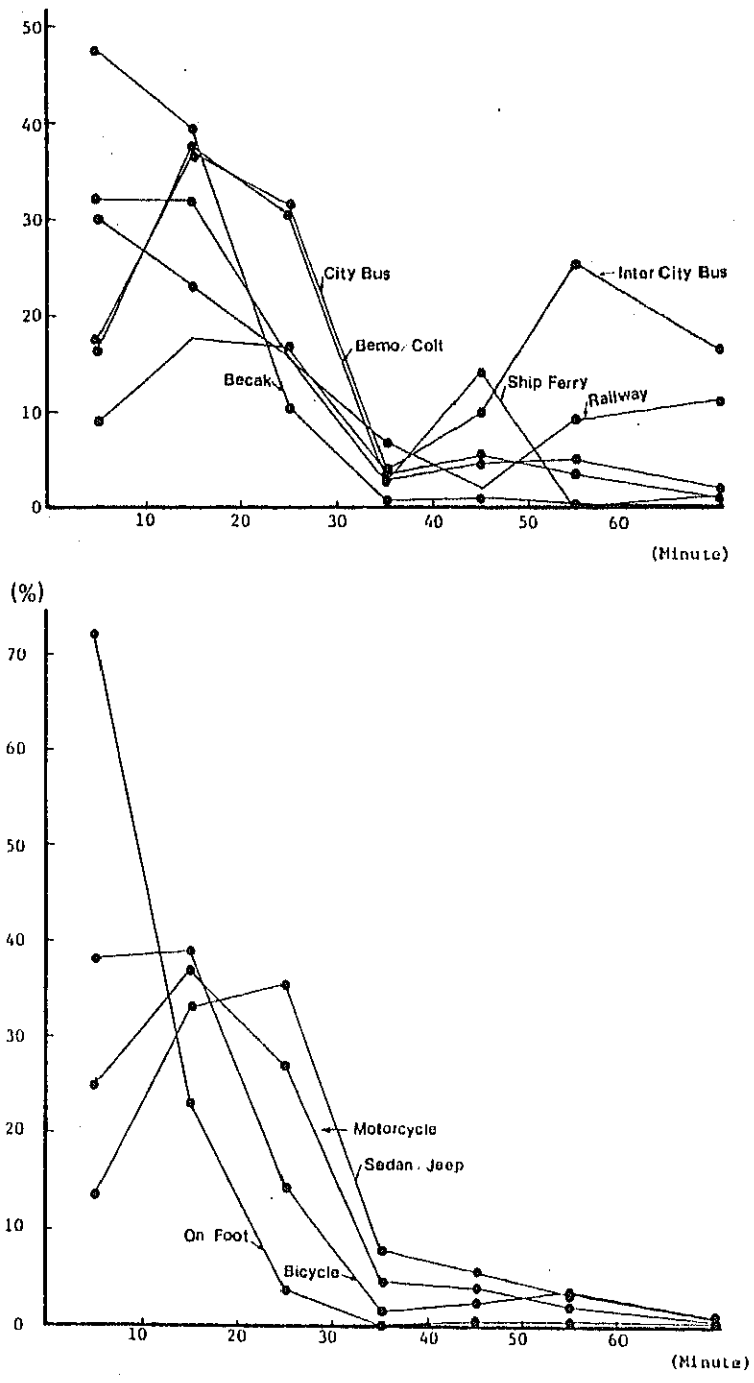


Fig. 3.1.3 DISTRIBUTION OF TRAVEL TIME BY MODE

Table 3.1.5 PERSON TRIP BLOCK O-D 1982

TYPE = ALL P.T.

Name of Block	1. SBY	2. SMA outside SBY	3. GKS outside SMA	4. Outside GKS	5. Total
1. SBY	3,542,236	27,563	17,113	38,500	3,625,412
2. SMA outside SBY	27,563	13,256	8,079	12,054	60,952
3. GKS outside SMA	17,113	8,079	13,947	12,363	51,502
4. Outside GKS	38,500	12,054	12,363	-	65,539
5. Total	3,625,412	60,952	51,502	65,539	3,803,405

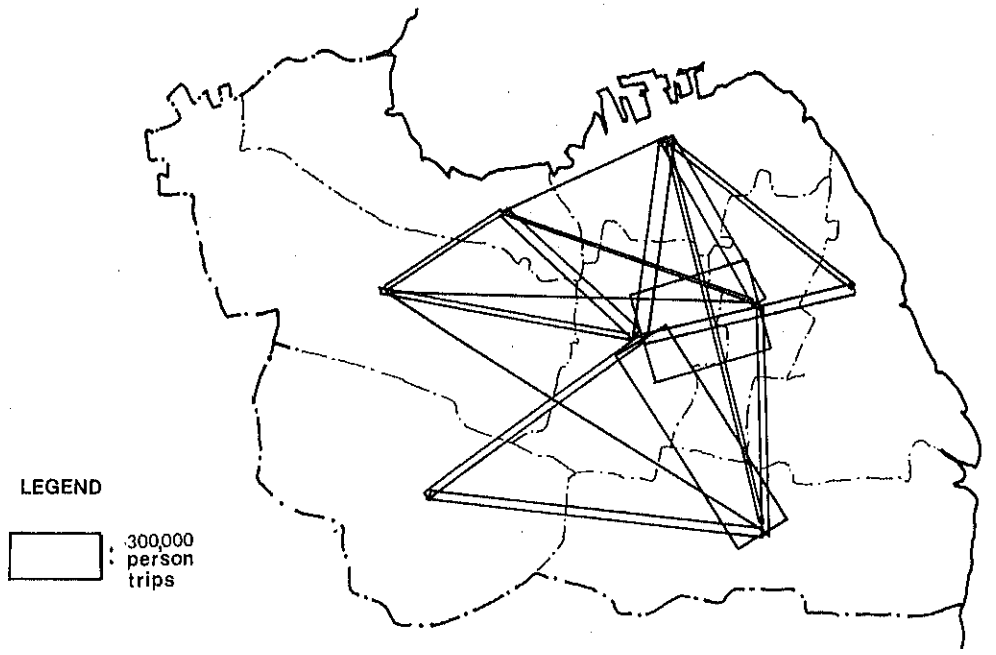


Fig. 3.1.8 (1) DESIRE LINE TRAFFIC IN SURABAYA, 1982

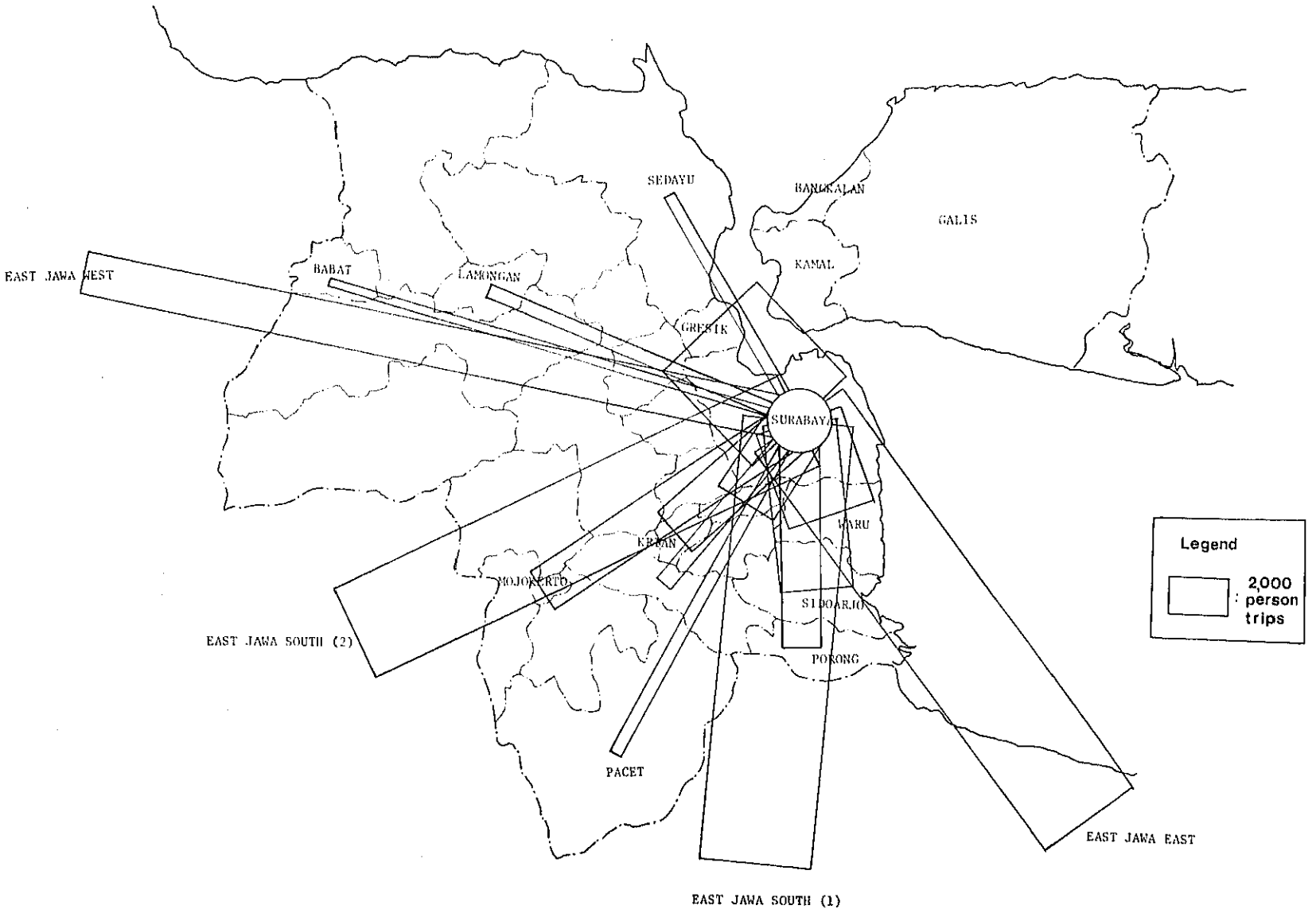


Fig. 3.1.8 (2) DESIRE LINE TRAFFIC IN GKS, 1982

(11) REGIONAL TRAFFIC O-D PATTERN

Based on the Roadside Interview Survey, vehicle O-D Table was estimated as shown in Table 3.2.1 and on which bases desire line traffic diagrams were prepared for sedan/jeep, motorcycles and trucks as presented in Fig. 3.2.8 (1 to 4).

Major traffic generating zones in GKS outside Surabaya are Gresik, Krian, Mojokerto, Sidoarjo, Waru and Bangkalan. Motorcycle and passenger cars mostly connect with Surabaya, and other O-D pair traffic is only found along the major corridors of Suabaya-Porong, Surabaya-Mojokerto, Surabaya-Gresik.

For trucks, however, a different pattern of traffic other than those related to Surabaya are derived. The desire line traffic between Gresik and Mojokerto; Cerme and Malang; and Taman and Malang are these major traffic flows.

Another feature of the truck flows in GKS Region is that extremely long distance trips such as Surabaya-Jakarta are compatible in volume with medium distance trip such as Surabaya-Krian, Surabaya-Waru, and Surabaya-Porong.

Surabaya is a nodal point for radial traffic to all of Java Island and Madura. In this sense, the western side of Surabaya has a larger coverage of potential traffic generation than the eastern side. There are two corridors extending to the west from Surabaya. One is via Gresik, Babat and Semarang, and the other is via Mojokerto, Jombang, Surakarta. The former route should be prepared to connect Metropolitan regions such as Jakarta, Cirebon, Semarang and Surabaya directly with a highway of high standard design, if traffic demand is to be satisfied. The latter should be prepared to connect regional urban centres and to serve mainly for interregional trips. By-passes are required to prevent traffic bottlenecks in the urban centres.

For GKS Region, some ring roads should be designated to expedite the traffic flows among regional urban centres such as Mojokerto, Sidoarjo, Gresik, Krian, Waru and Porong; and also to eliminate through traffic in Surabaya.

Table 3.2.1 REGIONAL TRAFFIC FLOWS IN 1982

		SBY	SMA Outside SBY	GKS Outside SMA	Outside GKS	Vehicle Trip End Total
SBY	Truck	-	7,922	3,602	7,011	18,535
	M. Cycle	-	9,819	2,827	1,440	14,086
	Sedan	-	4,096	1,887	3,151	9,134
	I. C. Bus	-	71	140	1,119	1,330
	Colt	-	820	1,173	226	2,219
SMA Outside SBY	Truck	7,922	3,791	1,113	3,749	16,575
	M. Cycle	9,819	6,508	2,346	1,137	19,810
	Sedan	4,096	652	374	1,520	6,642
	I. C. Bus	71	15	30	144	260
	Colt	820	623	899	330	2,672
GKS Outside SMA	Truck	3,602	1,113	1,711	1,903	8,329
	M. Cycle	2,827	2,346	5,147	563	10,883
	Sedan	1,887	374	1,066	1,127	4,454
	I. C. Bus	140	30	64	289	523
	Colt	1,173	899	1,244	459	3,775
Outside GKS	Truck	7,011	3,749	1,903	1,618	14,281
	M. Cycle	1,440	1,137	563	186	3,326
	Sedan	3,151	1,520	1,127	322	6,120
	I. C. Bus	1,119	144	289	-	1,552
	Colt	226	330	459	-	1,015
Vehicle Trip End Total	Truck	18,535	16,575	8,329	14,281	57,720
	M. Cycle	14,086	19,810	10,883	3,326	48,105
	Sedan	9,134	6,642	4,454	6,120	26,350
	I. C. Bus	1,330	260	523	1,552	3,665
	Colt	2,219	2,672	3,775	1,015	9,681

2.5 RIVERS AND UTILITIES

(1) RIVERS

Three river systems directly influence the GKS Region; Brantas river from the south, Sala river from the north and Lamong river from the west.

In the city areas of Surabaya, Sidoarjo and Gresik severe inundation experiences in every rainy season. Especially in Surabaya many secondary canals have reduced carrying capacity due to siltation, etc. and are subject to sea tide influence. All run-off is controlled by the dams/gates. Many irrigation canals already handle drainage water as well, and their carrying capacities do not meet the drainage demand from the urbanized area.

Reduction of carrying capacity of canals, lack of appropriate control and management of the dams/gates, geographic conditions and so on, cause inundation problems.

(2) WATER SUPPLY

Severe water shortage experiences in the Study area. Table 2.8.1 shows the existing situation in GKS Region.

The water use situation in SMA in 1980 was estimated and summarized as follows:

- Residential water-supply was estimated as 34.3% of the SMA population; piped service was 10.9% and vendor service was 23.4%. Piped water was supplied at 2.5 million m^3/month through 65,300 connections and selling water (vendor) was served at 407,400 m^3/month through 4,000 vendors.
- The other water supply for industrial, commercial and social were shown below.

Water Use	Number of Connections	Consumption (m^3/month)
Industrial	731	306,500
Port	2	25,000
Commercial	12,484	608,300
Social	3,087	706,900
Total	16,305	1,646,700

(3) WASTE WATER

Todate, there has been no operation of a wastewater treatment system in the GKS Region. Approximately 30% of the SMA population relies on household septic tanks and cesspools for domestic wastewater disposal. Other residents having no private household facilities rely on public toilets or use semi-private latrines located along many principal ditches, rivers and canals. Industries in SMA discharge untreated liquid wastes directly to nearby rivers or canals except Surabaya Industrial Estate Rungkut.

(4) SOLID WASTE

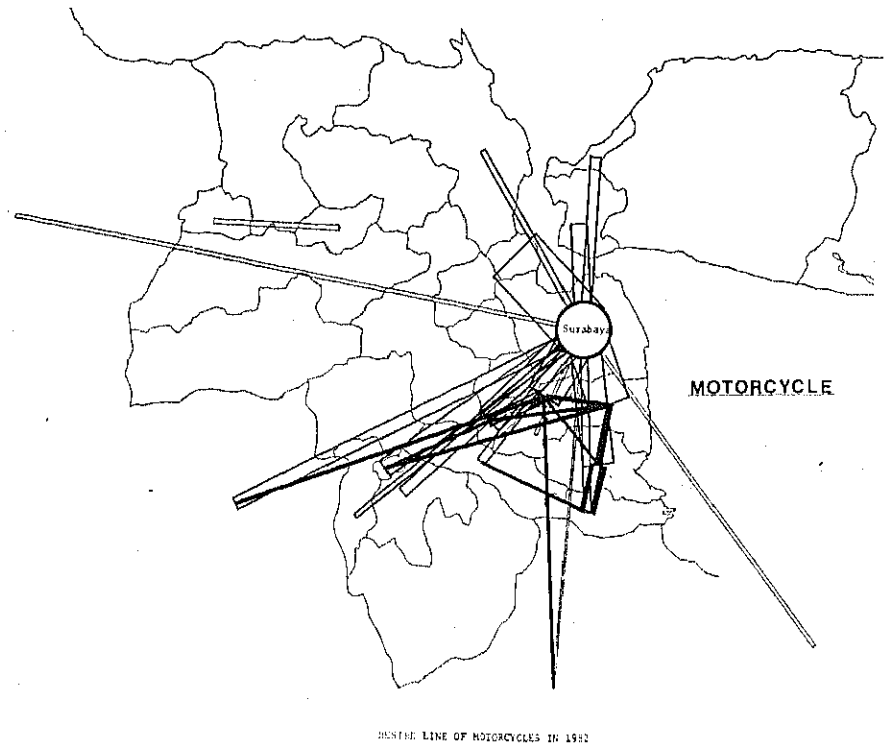
The solid waste production in SMA is estimated to be approximately 10,500 m^3/day (1,780 ton/day) and 3.6 l/capita/day and 614 g/capita/day. Compared with the production volume, the handled volume is assumed to be 35% in SMA. Remaining 65% of solid waste is not handled, and disposal is dumping into convenient areas such as nearby ditches and canals. Total 7 landfill sites (34 ha) and one compost plant are operated in SMA.

(5) ELECTRICITY

In 1981/82 some 1,950 GWH was generated in East Java and around 53% of the generation was produced in SMA.

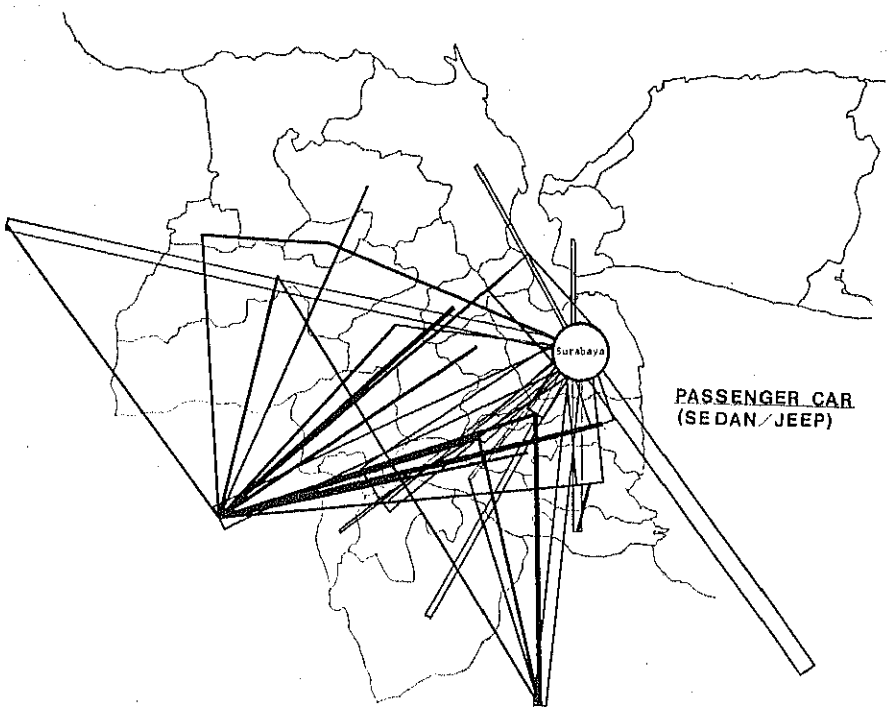
In GKS Region some 214,700 consumers consumed 863 GWH in 1981/82. The Surabaya, Gresik and Sidoarjo share was 91 percent of the total number of consumers and 96 percent of the total consumption in the Region.

1



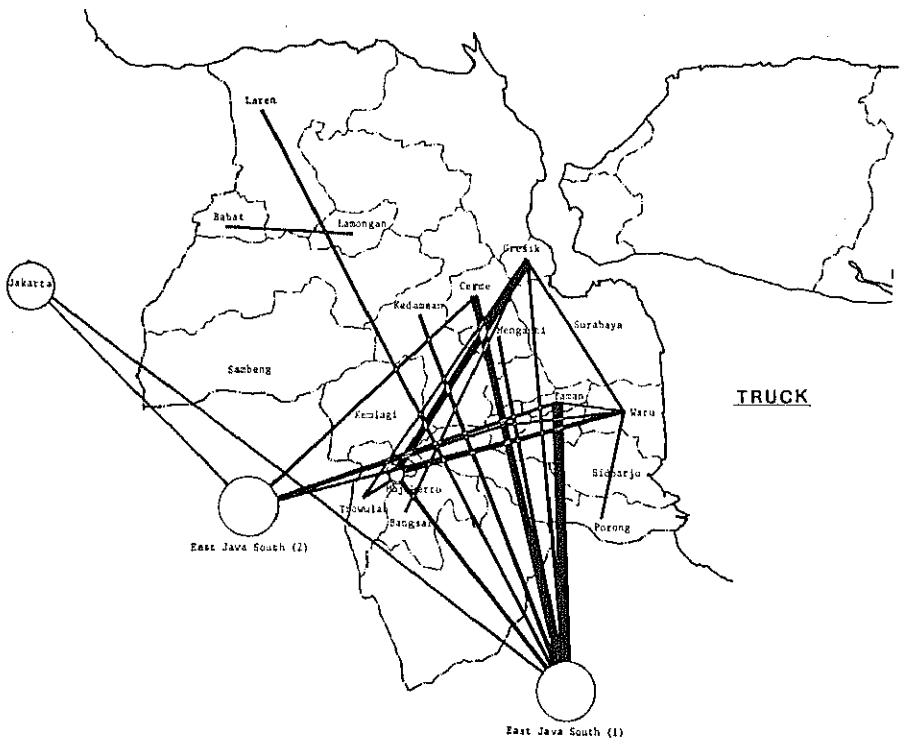
DESIRE LINE OF MOTORCYCLES IN 1982

2



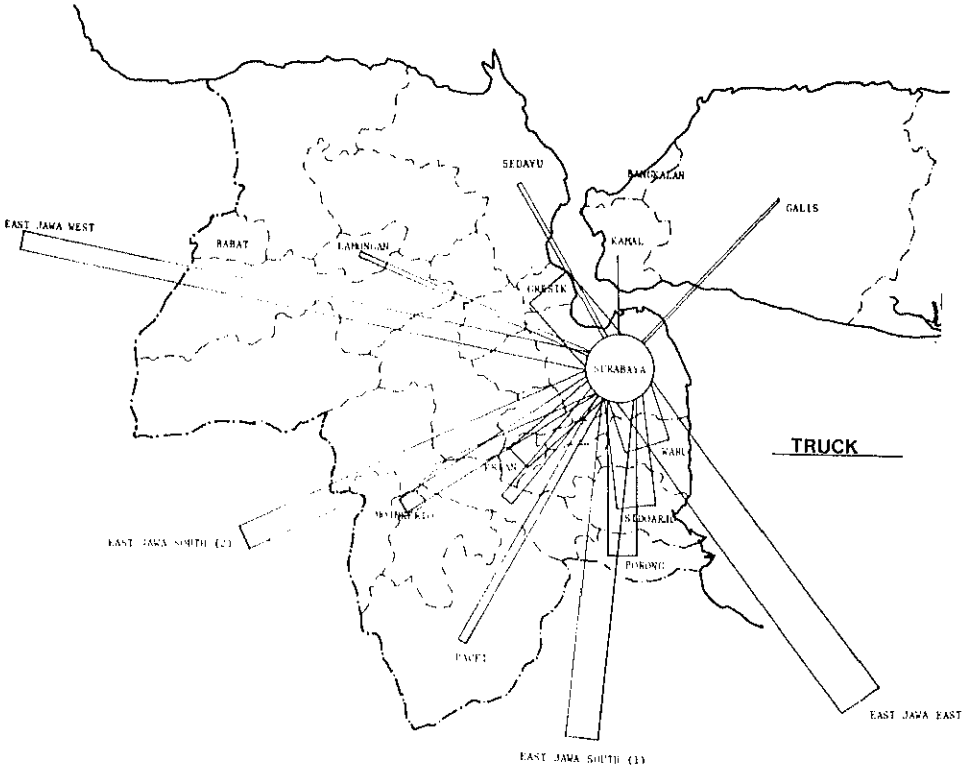
DESIRE LINE OF PASSENGER CARS IN 1982

3



DESIRE LINE OF TRUCKS RELATED TO OUTSIDE SURABAYA IN 1982

4



DESIRE LINE OF TRUCKS RELATED TO SURABAYA IN 1982

Fig. 3.2.8 DESIRE LINE TRAFFIC IN GKS REGION, 1982 (1 to 4)

(6) ENVIRONMENT

Some striking environmental problems are prevailing in SMA. These are inundation, water/solid waste pollution, and the traffic problem, which are described above. Air pollution and vibration by factories, however, have not accured as yet.

– Traffic Problem

In 1981 the total of 2,292 accidents occurred in Surabaya and the locations are distributed over all the urban area. The potential for traffic accident rises according to the traffic conditions (volume and quality) and the street structure. It is an apparent problem that many streets are used for multi-purpose needs and by various transport modes without any defined functional structural provision. Pedestrians are always exposed to traffic hazards and few side-walks and crossing bridges are provided.

– Water Pollution

The fundamental problem related to current wastewater practices in SMA, especially in Surabaya, is that of pollution – a slow but steady deterioration of the quality of the urban and rural environment brought about by inadequate collection and disposal of domestic and industrial wastes.

The Surabaya and Mas river shows that iron, nitrite and organic substances have high values and the number of coliform contained in the water starts increasing rapidly from the water intake of Nagagel Plant in Surabaya. The number reaches the maximum at Jembatan Merah bridge. It is understood that the Surabaya piped water supply has a perceptible colour and smell due to the high value of excreta.

The secondary drainage system is also polluted and extremely high values of DO, BOD and COD show in the down stream of the system.

Shallow ground water wells furnish water supply needs for the majority of the SMA's inhabitants. In July 1976 water samples from 38 shallow wells in Surabaya were tested and showed that coliform organisms were found in 14 (37 percent) of the wells at an average density of 530 colonies per 100 ml. Average chloride level was found to be 505 mg/l. 30 percent of the wells had levels exceeding Ministry of Health permissible limits (600 mg/l) while 87 percent were found to have chloride levels exceeding desirable limits (200 mg/l).

– Infectious Disease in Surabaya

Diseases related to digestive organs are still common in Surabaya and this is related to every day use and contact with ground water/surface water. Cholera decreased in number from 1976, while GEA (sudden and severe inflammation of stomach and intestines) recently increased dramatically. During the latest 10 years, the disease occurrence have a tendency to move from the CBD to the peripheral area of Surabaya.

Table 2.8.1 PIPED WATER SUPPLY SITUATION IN GKS REGION

Kabupaten/ Kotamadya	Service Level % ; L/day/Capita		Yield (L/sec), Water Source	Remarks
	City Area	Rural Area		
Lamongan	7% ; 10 L	-	10, Mantup Spring	May, 1982
Bangkalan	14% ; 22	-	35, Bancarang River	May, 1982
Mojokerto	2.4% ; 3[1)]	0.5% ; 1.8L	Kab.-115, Jubel, Mojo, Ubalan Springs Kot.-33, Balongsari, Jubel Panggreman Springs	Rural figures are for 1981. City figures are for Feb. 1982.
Sidoarjo	5% ; 3.2L[2)]		18-Jubel Spring 75-Umbulan, Pandaan Spring 20-Porong river	May, 1982
	12.1% ; 17.9	-		
Surabaya	49.4% ; 46.5		311-Taman, Umbulan, Springs 2500-Surabaya river	Jan, 1982
Gresik	10.6% ; 19.5	-	12-Suci Spring	Monthly average in 1981

Note : 1) These figures include residential houses, Social use, Hospital use.
2) These figures are for the whole Kabupaten.

PDAM SURABAYA PLAN (UP TO 1985)

Source	Existing (L/sec)	Future (L/sec)
Taman Spring	211	211
Umbulan Spring	100	150
Umbulan New Spring	-	3,000
Ngagel Plant- I	1,000	1,500
- II	1,000	1,000
- III	1,000	1,000
Karangpilang Plant	-	1,000
Mini Plant	-	100
Resource Development	-	100
T o t a l	3,211	8,061

2.6 EXISTING PROBLEMS

(1) SOCIO-ECONOMIC

- Concentration of population in the urban area
- Low level of per capita income
- Majority of low-income group
- Shortage of employment opportunities/increasing latent unemployments
- Low growth of General Regional Domestic Products
- Too big share of the tertiary sector in the industrial composition in Surabaya (73.0% GRDP Base)
- Shortage of skilled manpower supporting an industrial modernization.

(2) INDUSTRIAL ACTIVITIES

- Low activity of industrial foreign investments,
- Undevelopment of suitable land for industrial locations,
- Undevelopment of industrial infrastructures to maximize the accumulation of commercial functions,
- Undevelopment of distribution system in freight
- Low productivity of small-scale industry

(3) LANDUSE AND URBAN STRUCTURE

- Spatial limitation of capacity caused by the existing radial pattern
- Undevelopment of major structures coping with an anticipated urban growth.
- Functional confusion between commercial sector, manufacturing sector and housing.
- Housing sprawl without sufficient development of infrastructure.
- Lowering the central function by traffic congestion and by inflow of passing-through traffic into the busy area.
- Lack of total urban system by an undevelopment of secondary system.

(4) TRANSPORTATION

- Undevelopment of a transportation system coping with coming motorization society.
- Disorder of road using (Lack of functional classification) and of development in correspondent to functions
- Existence of bottle-necks of industrial traffic
- Undevelopment of public transportation system, especially a lack of mass-transportation network system
- Congestion of bus terminals
- Low service level of bus transport
- Shortage of port handling capacity
- Insufficient capacity of parking lots in the central areas
- Low capacity of ferry transportation between Surabaya and Kamal
- Undevelopment of distribution facilities and system
- Low capacity of Kali Mas Port

(5) RIVER/UTILITIES, AND ENVIRONMENT

- Inundation of secondary river/canal system
- Water shortage and low service level
- No operation of waste water treatment system
- Low service level of solid waste management
- Severe water pollution in water way system and ground water

2.7 SPATIAL AND PHYSICAL POTENTIAL

(1) DISTRIBUTION OF RESOURCES

(i) Mineral Resources

The main resources deposited in East Java are limestone, copper, zinc. Especially, the northern part of East Java, including the Study Area and Madura, possesses numerous deposits of limestone, and the development potential for cement manufacture is high.

(ii) Agricultural Products

Main agricultural products are maize, copra, beans, coffee, tobacco and peanut cakes products are main commodities for export through Tg. Perak port.

In the Study Area, sugarcane in Mojokerto and Sidourjo and beef in Bangkalan are noteworthy products.

For rice production Mojokerto and Sidourjo are most advanced and their productivity of more than 8 ton/ha is considered to be a very high level, while Lamongan and Bangkalan possess comparatively low productivity.

(2) EVALUATION FROM PHYSICAL FACTORS

The development potential for urbanization was evaluated by the existing physical conditions.

The Study Team derived the factors to be used such as nature, agricultural investment/irrigation, land use, accessibility, etc. for the potential evaluation of land and applied the Mesh Method (1 km x 1 km) for the area centered in Surabaya.

The evaluation results are the basis for selecting the area applicable for urban development and for forecasting the variation/distribution of area development.

(i) Evaluation-Ranking Factors

Each factor is classified by 5 ranks and individual score ranked from 1 to 5 is given to each block. The ranking of each evaluation factor is shown in Table 5.2.1.

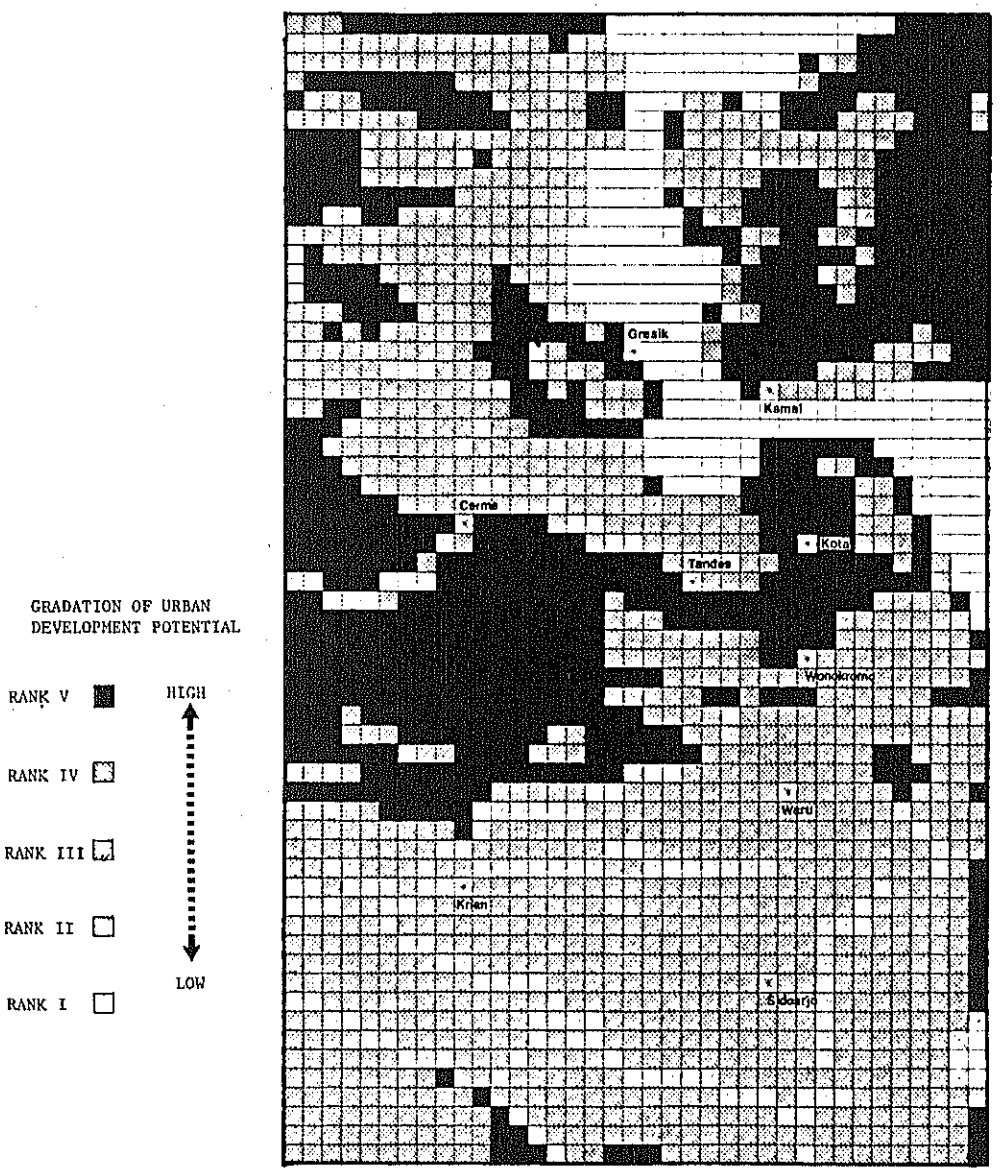
(ii) Evaluation Results

Fig. 5.2.5 shows the results for the practical cases.

In case II, the corridor of Surabaya-Sidoarjo and the areas around Gresik, Waru are evaluated highly.

Table 5.2.1 EVALUATION FACTOR AND SCORE FOR URBANIZATION

CODE NO.	EVALUATION FACTOR	SCORE				
		1	2	3	4	5
A	Natural Constraint - (I)	Swamp/ Flooding	-	Occasional Flooding	-	No Restraint
B	Natural Constraint - (II) (Land Slope)	15-40°	-	2-15	-	0-2
C	Agricultural Investment	Teknik	1/2 Teknik	Non Teknik	-	-
D	Land Use	River/ pond	Agricultural Land	Non-use	Village	Existing set-up Area
E	Infrastructure	No Road	Smaller than Local Road	Local Road	Collector Road	Arterial Road
F	Urban Activity - (I) (CBD & Tg. Perak)	More than 75 min.	60-75	45-60	30-45	Less than 30 minutes
G	Urban Activity - (II) (Juanda Airport)	More than 75 minutes	60-75	45-60	30-45	Less than 30 minutes



E–1 : Adopting only the constraint factors of A, B, and C.

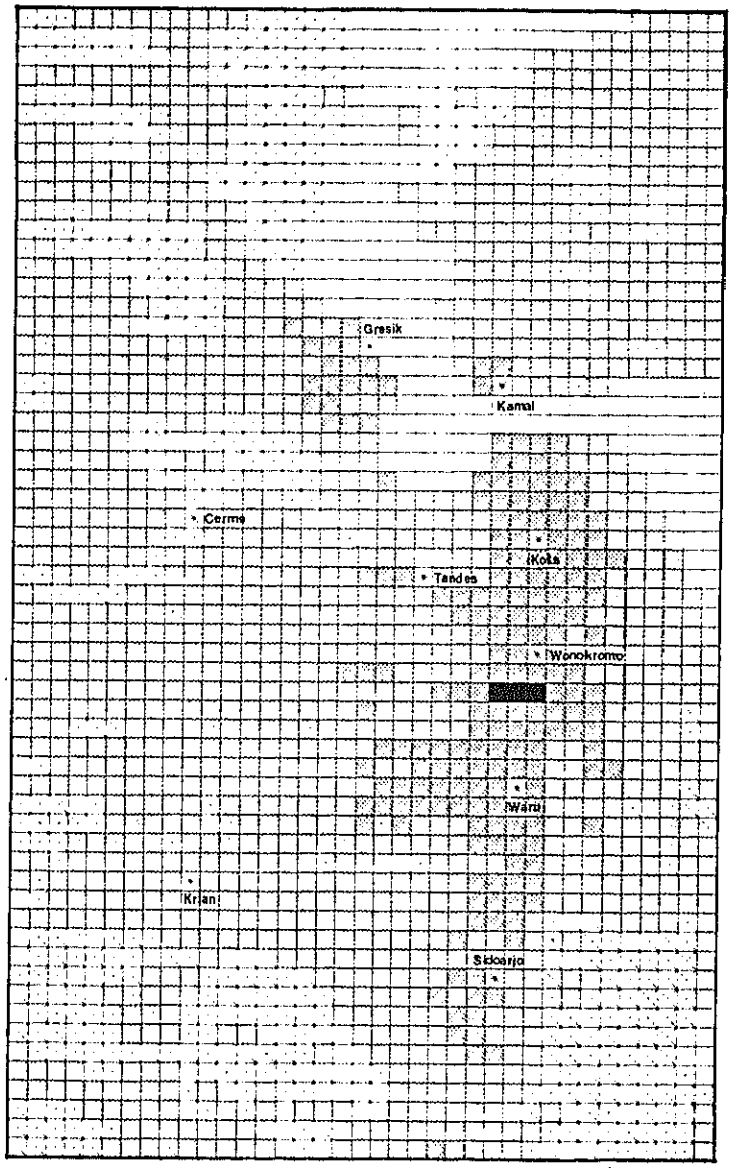
$R_1(i,j) = a \times F(A,i,j) + bF(B,i,j) + cF(c,i,j)$

here, $R_1(i,j)$: Total score of the block (i,j) in the equation E–1

$F(A,i,j)$, $F(B,i,j)$, $F(C,i,j)$: Individual score of the block (i,j) in the factor A, B, C respectively.

a, b, c : Weighting factor (a=b=c=1)

Fig. 5.2.4 EVALUATION OF URBAN DEVELOPMENT POTENTIAL (CASE I)



E–2 : Adopting all of the factors

$$R_2(i,j) = An\frac{7}{\sum_{n=1}} F(n,i,j)$$

here, $R_2(i,j)$: Total score of the block (i,j) in the Equation E–2.

$F(n,i,j)$: Individual score of the block (i,j) in the factor category (n).

An : Weighting factor for the category (n), An=1

Fig. 5.2.5(1) EVALUATION OF URBAN DEVELOPMENT POTENTIAL (CASE II)